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Contribution from the Office of Markets and Rural Organization,

CHARLES J. BRAND, *Chief.*

AMORTIZATION METHODS FOR FARM MORTGAGE LOANS.

By LEON E. TRUESDELL, *Field Assistant in Rural Organization*, and C. W. THOMPSON, *Specialist in Rural Organization.*

DEFINITION OF AMORTIZATION.

Amortization, as the term is commonly used in relation to farm mortgage loans, refers to the payment of a long-time loan in installments (usually annual or semiannual), covering both interest and principal. For example, if a farmer borrows \$1,000, at 5 per cent interest, to be paid back in 20 annual installments on the amortization plan which is recommended in this circular, he will make a payment of \$80.24 at the end of each year for 20 years, and then the debt will be canceled.

METHOD NO. 1—THE METHOD RECOMMENDED.

The simplest and, in general, the most satisfactory way to account for amortization payments is to take out of each installment an amount sufficient to cover the interest on the unpaid principal and apply the remainder immediately to the reduction of the principal. The installments are to be paid at the *end* of each year, not at the beginning. This method, which will be referred to as Method No. 1 throughout this circular, gives a new and smaller principal each year, and hence each year a smaller interest charge. It shows exactly what part of each payment has been used for interest and what part has been applied on the principal, and exactly how much is still due on the loan. The whole process is one which will be familiar to any farmer who has ever borrowed money with the privilege of making partial payments on the principal. That is, it makes of amortization a simple, familiar process, rather than something entirely new and untried.

Other methods of figuring amortization payments will be discussed later in this circular and specimen tables computed by the different methods will be given for comparison.

The first step in the construction of an amortization table in accordance with Method No. 1 is to ascertain the amount of the

NOTE.—This circular explains a simple method of computing amortization tables for use in connection with farm mortgage loans, gives specimen tables constructed in accordance with this method, and shows, for comparison, tables computed by other methods. It should be of interest to all farmers who are contemplating the borrowing of money to be repaid on the amortization plan, as well as to others who are concerned with the problems of farm mortgage credit.

annual payment which will be required to pay off the loan, with interest, in the time specified. This figure is found by dividing the amount of the loan by the present value (at compound interest) of a payment of *one dollar* at the end of each year for the term of the loan. Thus, the present value of a payment of \$1 at the end of each year for 20 years, reckoned at 5 per cent compound interest, is \$12.46221; dividing \$1,000 by this figure, we get 80.24 as the number of dollars that must be paid each year in order to cancel a loan of \$1,000, with interest at 5 per cent, in 20 years. In case of semiannual payments the interest periods are counted instead of the years, and a rate equal to one-half the annual rate is used.

The present value of an annual payment of one dollar at the end of each year for any number of years up to 40, computed at various rates, is given in Table 1.

TABLE 1.—*Present value of an annual payment of one dollar (at the end of each year) for any number of years up to 40, compound discount at 2, 2½, 3, 3½, 4, 4½, 5, 5½, and 6 per cent.*

Years.	Rate of discount.								
	2 per cent.	2½ per cent.	3 per cent.	3½ per cent.	4 per cent.	4½ per cent.	5 per cent.	5½ per cent.	6 per cent.
1.....	0.98039	0.97561	0.97087	0.96618	0.96154	0.95694	0.95238	0.94787	0.94340
2.....	1.94156	1.92742	1.91347	1.89970	1.88609	1.87267	1.85941	1.84632	1.83339
3.....	2.88388	2.85602	2.82861	2.80164	2.77509	2.74897	2.72325	2.69793	2.67301
4.....	3.80773	3.76197	3.71710	3.67308	3.62989	3.58753	3.54595	3.50515	3.46511
5.....	4.71346	4.64583	4.57971	4.51505	4.45182	4.38998	4.32948	4.27028	4.21236
6.....	5.60143	5.50813	5.41719	5.32855	5.24214	5.15787	5.07569	4.99553	4.91732
7.....	6.47199	6.34939	6.23028	6.11455	6.00205	5.89270	5.78637	5.68297	5.58238
8.....	7.32548	7.17014	7.01969	6.87396	6.73274	6.59589	6.46321	6.33457	6.20979
9.....	8.16224	7.97086	7.78611	7.60769	7.43533	7.26879	7.10782	6.95220	6.80169
10.....	8.98258	8.75206	8.53020	8.31661	8.11090	7.91272	7.72173	7.53763	7.36009
11.....	9.78685	9.51421	9.25263	9.00155	8.76048	8.52892	8.30641	8.09254	7.88687
12.....	10.57534	10.25776	9.95401	9.66334	9.38507	9.11858	8.86325	8.61852	8.38384
13.....	11.34837	10.98318	10.63496	10.30274	9.98565	9.68285	9.39357	9.11708	8.85268
14.....	12.10625	11.69091	11.29607	10.92052	10.56312	10.22283	9.89664	9.58965	9.29498
15.....	12.84926	12.38138	11.93794	11.51741	11.11839	10.73955	10.37966	10.03758	9.71225
16.....	13.57771	13.05500	12.56110	12.09412	11.65230	11.23402	10.83777	10.46216	10.10589
17.....	14.29187	13.71220	13.16612	12.65132	12.16567	11.70719	11.27406	10.86461	10.47726
18.....	14.99203	14.35336	13.75351	13.18968	12.65930	12.15999	11.68959	11.24607	10.82760
19.....	15.67846	14.97889	14.32380	13.70984	13.13394	12.59329	12.08532	11.60765	11.15812
20.....	16.35143	15.58916	14.87748	14.21241	13.59033	13.00794	12.46221	11.95038	11.46992
21.....	17.01121	16.18455	15.41503	14.69798	14.02916	13.40472	12.82115	12.27524	11.76408
22.....	17.65805	16.76541	15.93692	15.16713	14.45111	13.78442	13.16300	12.58317	12.04158
23.....	18.29220	17.33211	16.44361	15.62041	14.85684	14.14777	13.48557	12.87504	12.30438
24.....	18.91392	17.88498	16.93554	16.05837	15.24696	14.49548	13.79664	13.15170	12.55036
25.....	19.52345	18.42437	17.41315	16.48152	15.62208	14.82821	14.09394	13.41393	12.78336
26.....	20.12103	18.95061	17.87685	16.89036	15.98277	15.14661	14.37518	13.66250	13.00317
27.....	20.70690	19.46401	18.32703	17.28537	16.32958	15.45130	14.64303	13.89810	13.21053
28.....	21.28127	19.96489	18.76411	17.66702	16.66306	15.74287	14.89813	14.1242	13.40616
29.....	21.84438	20.45355	19.18846	18.03577	16.98371	16.02189	15.14107	14.33310	13.59072
30.....	22.39645	20.93029	19.60044	18.39205	17.29203	16.28889	15.37245	14.53375	13.76483
31.....	22.93770	21.39540	20.00043	18.73628	17.58849	16.54439	15.59281	14.72393	13.92909
32.....	23.46833	21.84917	20.38877	19.06887	17.87355	16.78889	15.80267	14.90420	14.08404
33.....	23.98856	22.29158	20.76579	19.39021	18.14764	17.02286	16.00255	15.07507	14.23023
34.....	24.49859	22.72378	21.13184	19.70069	18.41120	17.24676	16.19290	15.23703	14.36814
35.....	24.99862	23.14515	21.48722	20.00066	18.66461	17.46101	16.37419	15.39055	14.49825
36.....	25.48884	23.55625	21.83225	20.29050	18.90828	17.66604	16.54685	15.53607	14.62099
37.....	25.96945	23.95731	22.16724	20.57053	19.14258	17.86224	16.71128	15.67400	14.73678
38.....	26.44064	24.34860	22.49246	20.84109	19.36786	18.04999	16.86789	15.80474	14.84602
39.....	26.90259	24.73034	22.80822	21.10250	19.58448	18.22965	17.01704	15.92866	14.94907
40.....	27.35548	25.10277	23.11477	21.35508	19.79277	18.40158	17.15908	16.04612	15.04630

By the use of Table 1 a prospective borrower can determine readily how large the payments are which actually represent any stated rate of interest; and if he is then offered any proposition requiring larger payments, he may be sure that he is really called upon to pay more, in some form or other, for the use of the money, than the stated rate.

Table 2 gives, for convenience in reference, the annual installment required to pay off a loan of \$1,000 in 10, 15, 20, 25, 30, 35, and 40 years, at 5, 5½, and 6 per cent.

TABLE 2.—*Annual payments computed in accordance with the method recommended in this circular (Method No. 1) for a loan of \$1,000 to be paid off in 10, 15, 20, 25, 30, 35, and 40 years, at 5, 5½, and 6 per cent.*

Term (years).	Rate of interest.		
	5 per cent.	5½ per cent.	6 per cent.
10.....	\$129.50	\$132.67	\$135.87
15.....	96.34	99.63	102.96
20.....	80.24	83.68	87.18
25.....	70.95	74.55	78.23
30.....	65.05	68.81	72.65
35.....	61.07	64.97	68.97
40.....	58.28	62.32	66.46

Table 3 shows, for a 20-year loan of \$1,000 on the amortization plan outlined above, at 5, 5½, and 6 per cent, respectively, the annual payment required, the disposition of each payment, and the amount of the principal left unpaid at the end of each year.

So far we have considered only amortization tables where the payment was figured in such a way that it would exactly cancel the debt (or as nearly as possible without paying a fraction of a cent) in a stated number of whole years—generally a round number, such as 20. Amortization tables are also computed with the installments in round numbers of dollars, as \$75, or \$80, leaving the term to take care of itself. The only objection to this plan is that it is difficult, by reason of the odd number of years and the fractional payment at the end, to compare it with other propositions that may be offered.

Table 4 shows the annual status of a loan of \$1,000, at 5 per cent interest, with annual payments of \$75, \$80, and \$85.

TABLE 3.—*Amortization table computed in accordance with the method recommended in this circular (Method No. 1) for a loan of \$1,000, payable in 20 annual installments, with interest at 5, 5½, and 6 per cent.*

Completed years.	Interest at 5 per cent.				Interest at 5½ per cent.				Interest at 6 per cent.			
	Payment.	Interest.	Applied on principal.	Principal still unpaid.	Payment.	Interest.	Applied on principal.	Principal still unpaid.	Payment.	Interest.	Applied on principal.	Principal still unpaid.
1.....	\$80.24	\$50.00	\$30.24	\$669.76	\$83.68	\$55.00	\$28.68	\$871.32	\$87.18	\$60.00	\$27.18	\$972.82
2.....	80.24	48.49	31.75	938.01	83.68	53.42	30.26	941.06	87.18	58.37	28.81	944.01
3.....	80.24	46.90	33.34	904.67	83.68	51.76	31.92	909.14	87.18	56.64	30.54	913.47
4.....	80.24	45.23	35.01	869.66	83.68	50.00	33.68	875.46	87.18	54.81	32.37	881.10
5.....	80.24	43.48	36.76	832.90	83.68	48.15	35.53	839.93	87.18	52.87	34.31	846.79
6.....	80.24	41.65	38.59	794.31	83.68	46.20	37.48	802.45	87.18	50.81	36.37	810.42
7.....	80.24	39.72	40.52	753.79	83.68	44.13	39.55	762.90	87.18	48.63	38.55	771.87
8.....	80.24	37.69	42.55	711.24	83.68	41.96	41.72	721.18	87.18	46.31	40.87	731.00
9.....	80.24	35.56	44.68	666.56	83.68	39.66	44.02	677.16	87.18	43.86	43.32	687.08
10.....	80.24	33.33	46.91	619.65	83.68	37.24	46.44	630.72	87.18	41.26	45.92	641.76
11.....	80.24	30.98	49.26	570.39	83.68	34.69	48.99	581.73	87.18	38.51	48.67	593.09
12.....	80.24	28.52	51.72	518.67	83.68	32.00	51.68	530.05	87.18	35.59	51.59	541.50
13.....	80.24	25.93	54.31	464.36	83.68	29.15	54.53	475.52	87.18	32.49	54.69	486.81
14.....	80.24	23.22	57.02	407.34	83.68	26.15	57.53	417.99	87.18	29.21	57.97	428.84
15.....	80.24	20.37	59.87	347.47	83.68	22.99	60.69	357.30	87.18	25.73	61.45	367.39
16.....	80.24	17.37	62.87	284.60	83.68	19.65	64.03	293.27	87.18	22.04	65.14	302.25
17.....	80.24	14.23	66.01	218.59	83.68	16.13	67.55	225.72	87.18	18.14	69.04	233.21
18.....	80.24	10.93	69.31	149.28	83.68	12.41	71.27	154.45	87.18	13.99	73.19	160.02
19.....	80.24	7.46	72.78	76.50	83.68	8.49	75.19	79.26	87.18	9.60	77.58	82.44
20.....	80.33	3.83	76.50	.....	83.62	4.36	79.26	.....	87.39	4.95	82.44	.....
Total.....	1,604.89	604.89	1,000.00	.....	1,673.54	673.54	1,000.00	.....	1,743.81	743.81	1,000.00	.....

TABLE 4.—Even payment amortization table, for a loan of \$1,000 payable in annual installments of \$75, \$80, and \$90, with interest at 5 per cent.

Completed years.	Annual payments of \$75.				Annual payments of \$80.				Annual payments of \$90.			
	Payment.	Interest.	Applied on principal.	Principal still un- paid.	Payment.	Interest.	Applied on principal.	Principal still un- paid.	Payment.	Interest.	Applied on principal.	Principal still un- paid.
1.	\$75.00	\$50.00	\$25.00	\$975.00	\$80.00	\$50.00	\$30.00	\$970.00	\$90.00	\$50.00	\$40.00	\$960.00
2.	75.00	48.75	26.25	948.75	80.00	48.50	31.50	938.50	90.00	48.00	42.00	918.00
3.	75.00	47.44	27.56	921.19	80.00	46.93	33.07	905.43	90.00	45.90	44.10	873.90
4.	75.00	46.06	28.94	892.25	80.00	45.27	34.73	870.70	90.00	43.70	46.31	827.60
5.	75.00	44.61	30.39	861.86	80.00	43.54	36.47	834.23	90.00	41.38	48.62	778.97
6.	75.00	43.09	31.91	829.95	80.00	41.71	38.29	795.94	90.00	38.95	51.05	727.92
7.	75.00	41.50	33.50	796.45	80.00	39.80	40.20	755.71	90.00	36.40	53.60	674.32
8.	75.00	39.82	35.18	761.27	80.00	37.79	42.21	713.53	90.00	33.72	56.28	618.04
9.	75.00	38.06	36.94	724.34	80.00	35.68	44.32	669.20	90.00	30.90	59.10	558.94
10.	75.00	36.22	38.78	685.55	80.00	33.46	46.54	622.66	90.00	27.95	62.05	496.88
11.	75.00	34.28	40.72	644.83	80.00	31.13	48.87	573.80	90.00	24.81	65.16	431.73
12.	75.00	32.24	42.76	602.08	80.00	28.69	51.31	522.49	90.00	21.59	68.41	363.31
13.	75.00	30.10	44.90	557.17	80.00	26.12	53.87	468.61	90.00	18.16	71.83	291.48
14.	75.00	27.86	47.14	510.03	80.00	23.43	56.57	412.04	90.00	14.57	75.43	216.05
15.	75.00	25.50	49.50	460.54	80.00	20.60	59.40	352.64	90.00	10.80	79.20	136.86
16.	75.00	23.03	51.97	408.56	80.00	17.63	62.37	290.27	90.00	6.84	83.16	53.70
17.	75.00	20.43	54.57	353.99	80.00	14.51	65.49	224.79	56.38	2.68	53.70	.....
18.	75.00	17.70	57.30	296.69	80.00	11.24	68.76	156.03	.....	.....	.....	.....
19.	75.00	14.83	60.17	236.52	80.00	7.80	72.20	83.83	.....	.....	.....	.....
20.	75.00	11.83	63.17	173.35	80.00	4.19	75.81	8.02	.....	.....	.....	.....
21.	75.00	8.67	66.33	107.02	8.42	.40	8.02	.....	.....	.....	.....	.....
22.	75.00	5.35	69.65	37.37	.....	.....	.....	.....	.....	.....	.....	.....
23.	39.24	1.87	37.37	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total	1,689.24	689.24	1,000.00	.....	1,608.42	608.42	1,000.00	.....	1,496.38	496.38	1,000.00	.....

METHOD NO. 2—ADVANCE PAYMENT.

One important variation from the amortization plan described above is to require the payment of the installments in advance—at the beginning of the year instead of at the end.

Under this plan the first installment is taken out of the amount represented by the face of the note, so that a man giving his note for \$1,000, to be paid in 20 annual installments in advance, with interest at 5 per cent, would actually receive in cash only \$922.06—one installment of \$77.94 being deducted. In case the borrower had actual need of the full \$1,000, therefore, he would have to give his note for a considerably larger sum (\$1,084.53), and pay installments on that larger sum.

Tables 5 and 6 afford opportunity for comparison between the results obtained by this method and by Method No. 1 in two different ways. Table 5 gives comparative figures computed according to Method No. 1 for a loan yielding the same amount of cash as the \$1,000 advance-payment loan, and paid off at the same time, while Table 6 gives the figures for an advance-payment loan yielding \$1,000 in cash and paid off at the end of the twentieth year, with a parallel table computed by Method No. 1.

TABLE 5.—*Advance payment amortization table (Method No. 2): Face of note \$1,000, 20 payments, 5 per cent interest; with parallel table computed by Method No. 1.*

Completed years.	Method No. 2: Face of note \$1,000, 20 payments, in advance.				Method No. 1: Amount of loan \$922.06, ¹ 19 annual payments (at end of year).			
	Payment (in ad- vance).	Interest (in ad- vance).	Applied on prin- cipal. ²	Principal still unpaid.	Payment.	Interest.	Applied on prin- cipal.	Principal still unpaid.
0.....	\$77.94	\$48.53	\$29.41	\$970.59	.....	.....	.....	\$922.06
1.....	77.94	46.98	30.96	939.63	\$76.30	\$46.10	\$30.20	891.86
2.....	77.94	45.35	32.59	907.04	76.30	44.59	31.71	860.15
3.....	77.94	43.64	34.30	872.74	76.30	43.01	33.29	826.86
4.....	77.94	41.83	36.11	836.63	76.30	41.34	34.96	791.90
5.....	77.94	39.93	38.01	798.62	76.30	39.60	36.70	755.20
6.....	77.94	37.93	40.01	758.61	76.30	37.76	38.54	716.66
7.....	77.94	35.82	42.12	716.49	76.30	35.83	40.47	676.19
8.....	77.94	33.61	44.33	672.16	76.30	33.81	42.49	633.70
9.....	77.94	31.28	46.66	625.50	76.30	31.69	44.61	589.09
10.....	77.94	28.82	49.12	576.38	76.30	29.45	46.85	542.24
11.....	77.94	26.23	51.71	524.67	76.30	27.11	49.19	493.05
12.....	77.94	23.51	54.43	470.24	76.30	24.65	51.65	441.40
13.....	77.94	20.65	57.29	412.95	76.30	22.07	54.23	387.17
14.....	77.94	17.63	60.31	352.64	76.30	19.36	56.94	330.23
15.....	77.94	14.46	63.48	289.16	76.30	16.51	59.79	270.44
16.....	77.94	11.12	66.82	222.34	76.30	13.52	62.78	207.66
17.....	77.94	7.60	70.34	152.00	76.30	10.38	65.92	141.74
18.....	77.94	3.90	74.04	77.96	76.30	7.09	69.21	72.53
19.....	77.96	.....	77.96	.....	76.16	3.63	72.53	.....
Total.....	1,558.82	558.82	1,000.00	.....	1,449.56	527.50	922.06	.....

¹ This is the amount which the borrower receives in cash, after the first advance installment is deducted from the face of the loan. Since this is all the money which the borrower will get from the loan to use in his business, the parallel table (following Method No. 1) has been figured on a basis which will yield the same amount in cash, payable in the same number of subsequent installments.

² At time of payment. Interest is reckoned on that part of the principal remaining after the payment is credited; that is, on the figure shown under "Principal still unpaid" for the same year.

TABLE 6.—*Advance payment amortization table (Method No. 2) for loan to yield \$1,000 in cash after deduction of first installment: Face of note \$1,082.04, payments completed at end of twentieth year, 5 per cent interest; with parallel table computed by Method No. 1.*

Completed years.	Method No. 2 (advance payment plan): Loan to yield \$1,000 in cash to borrower. ¹				Method No. 1: Amount of loan \$1,000, 20 annual payments (at end of year).			
	Payment (in ad- vance).	Interest (in ad- vance).	Applied on prin- cipal. ²	Princi- pal still unpaid.	Pay- ment.	Interest.	Applied on prin- cipal.	Princi- pal still unpaid.
0.....	\$82.04	\$52.63	\$29.41	\$1,052.63	.....	.....	.....	\$1,000.00
1.....	82.04	51.08	30.96	1,021.67	\$80.24	\$50.00	\$30.24	969.76
2.....	82.04	49.45	32.59	989.08	80.24	48.49	31.75	938.01
3.....	82.04	47.74	34.30	954.78	80.24	46.90	33.34	904.67
4.....	82.04	45.93	36.11	918.67	80.24	45.23	35.01	869.66
5.....	82.04	44.03	38.01	880.66	80.24	43.48	36.76	832.90
6.....	82.04	42.03	40.01	840.65	80.24	41.65	38.59	794.31
7.....	82.04	39.92	42.12	798.53	80.24	39.72	40.52	753.79
8.....	82.04	37.71	44.33	754.20	80.24	37.69	42.55	711.24
9.....	82.04	35.38	46.66	707.54	80.24	35.56	44.68	666.56
10.....	82.04	32.92	49.12	658.42	80.24	33.33	46.91	619.65
11.....	82.04	30.33	51.71	606.71	80.24	30.98	49.26	570.39
12.....	82.04	27.61	54.43	552.28	80.24	28.52	51.72	518.67
13.....	82.04	24.75	57.29	494.99	80.24	25.93	54.31	464.36
14.....	82.04	21.73	60.31	434.68	80.24	23.22	57.02	407.34
15.....	82.04	18.56	63.48	371.20	80.24	20.37	59.87	347.47
16.....	82.04	15.22	66.82	304.38	80.24	17.37	62.87	284.60
17.....	82.04	11.70	70.34	234.04	80.24	14.23	66.01	218.59
18.....	82.04	8.00	74.04	160.00	80.24	10.93	69.31	149.28
19.....	82.04	4.10	77.94	82.06	80.24	7.46	72.78	76.50
20.....	82.06	.....	82.06	.....	80.33	3.83	76.50	.....
Total.....	1,722.86	640.82	1,082.04	.....	1,604.89	604.89	1,000.00	.....

¹ The face of the note is \$1,082.04; the number of payments, 21; that is, 20 payments made subsequent to the time of borrowing the money, at which time the first installment is deducted.

² At time of payment. Interest is reckoned on that part of the principal remaining after the payment is credited: that is, on the figure shown under "Principal still unpaid" for the same year.

METHOD NO. 3—SINKING FUND.

Another variation in the manner of computing amortization tables may be termed the sinking-fund method. According to this method the principal of the loan remains the same throughout the whole period, instead of being reduced gradually as payments are made in excess of the accrued interest. The excess payments, which, if one were using Method No. 1, would be immediately applied to the reduction of the principal, are accumulated in a sinking fund (sometimes called a reserve) for the payment of the loan at maturity. The sinking fund is credited with interest at a given rate. If this rate is the same as the rate on the loan, and if the interest is compounded as often as payments are made, then the actual result will be the same as if Method No. 1 had been followed, provided payments are not required in advance. Under these conditions the chief disadvantages of the sinking-fund method are that it is needlessly cumbersome and that many borrowers find it difficult to understand. Where the payments have to be made in advance, however, the annual installment required under the sinking-fund plan will be somewhat larger

(\$78.80, as compared with \$77.94, on a 20-payment loan, at 5 per cent, with the face of the note \$1,000), even where the rate of interest allowed on the sinking fund is the same as that charged on the loan.

But where the sinking-fund method is employed in actual practice (and it is used rather widely) the interest allowed on the sinking fund is often computed at a lower rate than the interest on the loan. For example, the lender may charge interest at 5 per cent on the loan, and allow only 3 per cent interest on the sinking fund. The use of this lower rate for the interest on the sinking fund materially increases the size of the installment required to pay off the loan in a given number of years. On a loan of \$1,000, for example, to be paid in 20 annual installments, the payment required, with 5 per cent on the loan and 3 per cent on the sinking fund, is \$87.22, as compared with \$80.24 where the interest is reckoned at 5 per cent on both loan and sinking fund.

Table 7 illustrates these two methods of computing amortization payments by the use of a sinking fund, and shows, for comparison, the figures obtained in accordance with Method No. 1.

TABLE 7.—Sinking fund amortization table (Method No. 3) for loan of \$1,000, 20 annual payments (at end of year), 5 per cent interest on loan, interest allowed on sinking fund (a) at 5 per cent and (b) at 3 per cent; with parallel table computed by Method No. 1.

Completed years.	(a) Interest allowed on sinking fund at 5 per cent.					(b) Interest allowed on sinking fund at 3 per cent.					Method No. 1: Payments applied directly on principal.				
	Payment.	Interest.	Sinking fund.	Balance unpaid.		Payment.	Interest.	Sinking fund.	Balance unpaid.		Payment.	Interest.	Applied on principal.	Principal still unpaid.	
1.....	\$80.24	\$50.00	\$30.24	\$969.76		\$87.22	\$50.00	\$37.22	\$962.78		\$80.24	\$50.00	\$30.24	\$969.76	
2.....	80.24	50.00	61.99	938.01		87.22	50.00	75.56	924.44		80.24	48.49	31.75	938.01	
3.....	80.24	50.00	95.33	904.67		87.22	50.00	115.05	884.95		80.24	46.90	33.34	904.67	
4.....	80.24	50.00	130.34	869.66		87.22	50.00	155.72	851.28		80.24	45.23	35.01	869.66	
5.....	80.24	50.00	167.10	832.90		87.22	50.00	197.61	802.39		80.24	43.48	36.76	832.90	
6.....	80.24	50.00	205.69	794.31		87.22	50.00	240.76	759.24		80.24	41.65	38.59	794.31	
7.....	80.24	50.00	246.21	753.79		87.22	50.00	285.20	714.80		80.24	39.72	40.52	753.79	
8.....	80.24	50.00	288.77	711.23		87.22	50.00	330.98	669.02		80.24	37.69	42.55	711.23	
9.....	80.24	50.00	333.44	666.56		87.22	50.00	378.13	621.87		80.24	35.56	44.68	666.56	
10.....	80.24	50.00	380.36	619.61		87.22	50.00	426.69	573.31		80.24	33.33	46.91	619.65	
11.....	80.24	50.00	429.61	570.39		87.22	50.00	476.71	523.29		80.24	30.98	49.26	570.39	
12.....	80.24	50.00	481.33	518.67		87.22	50.00	528.23	471.77		80.24	28.52	51.72	518.67	
13.....	80.24	50.00	535.64	464.36		87.22	50.00	584.30	418.70		80.24	25.93	54.31	464.36	
14.....	80.24	50.00	592.66	407.34		87.22	50.00	635.96	364.04		80.24	23.22	57.02	407.31	
15.....	80.24	50.00	652.54	347.46		87.22	50.00	692.26	307.74		80.24	20.37	59.87	347.47	
16.....	80.24	50.00	715.40	284.60		87.22	50.00	750.25	249.75		80.24	17.37	62.87	284.60	
17.....	80.24	50.00	781.41	218.59		87.22	50.00	809.98	190.02		80.24	14.23	66.01	218.59	
18.....	80.24	50.00	850.72	149.28		87.22	50.00	871.50	128.50		80.24	10.93	69.31	149.28	
19.....	80.24	50.00	923.50	76.50		87.22	50.00	934.87	65.13		80.24	7.46	72.78	76.50	
20.....	80.33	50.00	1,000.00	.....		87.08	50.00	1,000.00	.....		80.33	3.83	76.50	.....
Total.....	1,604.89	1,000.00	.....	.....		1,744.26	1,000.00	.....	.....		1,604.89	604.89	1,000.00	.....

METHODS NO. 2 AND NO. 3 COMBINED.

The two-rate sinking fund method of computing amortization payments, which has just been described, is frequently combined with the requirement that the payments be made in advance, as illustrated in Table 8. In this table the interest on the loan is computed at 6 per cent, with interest at 4 per cent allowed on the sinking fund. The net result of this combination is an annual payment of \$92.29, as compared with a payment of \$81.35 for a loan yielding the same amount of cash to the borrower under the plan represented by Method No. 1.

TABLE 8.—*Advance payment sinking fund table (Methods No. 2 and No. 3 combined): Face of note \$1,000, 20 payments, 6 per cent interest on loan and 4 per cent on sinking fund; with parallel table computed by Method No. 1.*

Completed years.	Methods No. 2 and No. 3 combined (advance payment sinking fund plan): Face of note \$1,000, 6 per cent interest on loan and 4 per cent on sinking fund.				Method No. 1: Amount of loan \$907.71, ¹ interest at 6 per cent, 19 annual payments (at end of year).			
	Payment (in advance).	Interest (in advance).	Sinking fund.	Balance unpaid.	Pay ment.	Interest.	Applied on principal.	Principal still unpaid.
0.....	\$92.29	\$60.00	\$33.58	\$966.42	.....	.....	.....	\$907.71
1.....	92.29	60.00	68.51	931.49	\$81.35	\$54.46	\$26.89	880.82
2.....	92.29	60.00	104.83	895.17	81.35	52.85	28.50	852.32
3.....	92.29	60.00	142.60	857.40	81.35	51.14	30.21	822.11
4.....	92.29	60.00	181.89	818.11	81.35	49.33	32.02	790.09
5.....	92.29	60.00	222.75	777.25	81.35	47.41	33.94	756.15
6.....	92.29	60.00	265.24	734.76	81.35	45.37	35.98	720.17
7.....	92.29	60.00	309.43	690.57	81.35	43.21	38.14	682.03
8.....	92.29	60.00	355.39	644.61	81.35	40.92	40.43	641.60
9.....	92.29	60.00	403.19	596.81	81.35	38.50	42.85	598.75
10.....	92.29	60.00	452.89	547.11	81.35	35.93	45.42	553.33
11.....	92.29	60.00	504.59	495.41	81.35	33.20	48.15	505.18
12.....	92.29	60.00	558.36	441.64	81.35	30.31	51.04	454.14
13.....	92.29	60.00	614.27	385.73	81.35	27.25	54.10	400.04
14.....	92.29	60.00	672.42	327.58	81.35	24.00	57.35	342.69
15.....	92.29	60.00	732.90	267.10	81.35	20.56	60.79	281.90
16.....	92.29	60.00	795.80	204.20	81.35	16.91	64.44	217.46
17.....	92.29	60.00	861.21	138.79	81.35	13.05	68.30	149.16
18.....	92.29	60.00	929.24	70.76	81.35	8.95	72.40	76.76
19.....	92.29	60.00	1,000.00	.....	81.37	4.61	76.76	.....
Total.....	1,845.80	1,200.00	.....	.....	1,545.67	637.96	907.71	.....

¹ This is the amount which the borrower receives in cash, after the first advance installment is deducted from the face of the loan. Since this is all the money which the borrower will get from the loan to use in his business, the parallel table (following Method No. 1) has been figured on a basis which will yield the same amount in cash, payable in the same number of subsequent installments.

METHOD NO. 4—EXTRA CHARGES.

A third variation from the amortization plan first described consists in the practice of subtracting from the installment payments not only the accrued interest but also an extra charge (for expenses or profits) before the balance is credited on the principal. Sometimes this extra charge takes the form of a percentage on the unpaid principal, in which case it is in effect an addition to the interest rate; and sometimes it is in the form of a uniform deduction throughout the life of the loan. Both of these methods are illustrated in Table 9, which gives also, for comparison, the figures obtained by Method No. 1.

TABLE 9.—Amortization table involving extra charges (Method No. 4): Amount of loan \$1,000, 20 annual payments at end of year, 5 per cent interest, extra charge for expenses, etc., (a) in the form of a percentage (1 per cent) on the unpaid principal, and (b) as a uniform amount deducted from each payment; with parallel table computed by Method No. 1.

Completed years.	(a) Expenses charged as a percentage on the unpaid principal.					(b) Expenses charged as a uniform amount.					Method No. 1: No extra charge.			
	Pay- ment.	Inter- est.	Expen- ses.	Applied on principal.	Principal still unpaid.	Pay- ment.	Inter- est.	Expen- ses.	Applied on principal.	Principal still unpaid.	Pay- ment.	Inter- est.	Applied on principal.	Principal still unpaid.
1.....	\$87.18	\$50.00	\$10.00	\$27.18	\$972.82	\$85.00	\$50.00	\$4.76	\$30.24	\$969.76	\$80.24	\$50.00	\$30.24	\$969.76
2.....	87.18	48.64	9.73	28.81	944.04	85.00	48.49	4.76	31.75	938.01	80.24	48.49	31.75	938.01
3.....	87.18	47.20	9.44	30.54	913.47	85.00	46.90	4.76	33.34	904.67	80.24	46.90	33.34	904.67
4.....	87.18	45.67	9.13	32.38	881.09	85.00	45.23	4.76	35.01	869.66	80.24	45.23	35.01	869.66
5.....	87.18	44.05	8.81	34.32	846.77	85.00	43.48	4.76	36.76	832.90	80.24	43.48	36.76	832.90
6.....	87.18	42.34	8.47	36.37	810.40	85.00	41.65	4.76	38.59	794.31	80.24	41.65	38.59	794.31
7.....	87.18	40.52	8.10	38.56	771.84	85.00	39.72	4.76	40.52	753.79	80.24	39.72	40.52	753.79
8.....	87.18	38.59	7.72	40.87	730.97	85.00	37.69	4.76	42.55	711.24	80.24	37.69	42.55	711.24
9.....	87.18	36.55	7.31	43.32	687.65	85.00	35.56	4.76	44.68	666.56	80.24	35.56	44.68	666.56
10.....	87.18	34.38	6.88	45.92	641.73	85.00	33.33	4.76	46.91	619.65	80.24	33.33	46.91	619.65
11.....	87.18	32.09	6.42	48.67	593.06	85.00	30.98	4.76	49.26	570.39	80.24	30.98	49.26	570.39
12.....	87.18	29.65	5.93	51.60	541.46	85.00	28.52	4.76	51.72	518.67	80.24	28.52	51.72	518.67
13.....	87.18	27.07	5.41	54.70	486.76	85.00	25.93	4.76	54.31	464.36	80.24	25.93	54.31	464.36
14.....	87.18	24.34	4.87	57.97	428.79	85.00	23.22	4.76	57.02	407.34	80.24	23.22	57.02	407.34
15.....	87.18	21.44	4.29	61.45	367.34	85.00	20.37	4.76	59.87	347.47	80.24	20.37	59.87	347.47
16.....	87.18	18.37	3.67	65.14	302.20	85.00	17.37	4.76	62.87	284.60	80.24	17.37	62.87	284.60
17.....	87.18	15.11	3.02	69.05	233.15	85.00	14.23	4.76	66.01	218.59	80.24	14.23	66.01	218.59
18.....	87.18	11.66	2.33	73.19	159.96	85.00	10.93	4.76	69.31	149.28	80.24	10.93	69.31	149.28
19.....	87.18	8.00	1.60	77.58	82.38	85.00	7.46	4.76	72.78	76.50	80.24	7.46	72.78	76.50
20.....	87.32	4.12	.82	82.38	.....	85.09	3.83	4.76	76.50	.....	80.33	3.83	76.50	.....
Total.....	1,743.74	619.79	123.95	1,000.00	.....	1,700.09	604.89	95.20	1,000.00	.....	1,604.89	604.89	1,000.00	.....

CONCLUSION.

In conclusion, it may be said that the simplest methods of computation, so long as they are adequate, are always the best; and that nothing is gained (for the borrower, at any rate) by the use of any method of computing amortization payments more complicated than the one first presented in this circular (Method No. 1).

Interest on farm-mortgage loans is usually reckoned on the basis of payment at the end of the interest period rather than at the beginning; and the requirement that the installments be paid in advance adds materially to the cost of a loan, as the examples given in Tables 5 and 6 have shown. Further, the use of the sinking fund plan, with a lower rate of interest allowed on the accumulated payments in the sinking fund than that charged on the loan, results in a very material increase in the cost of the loan to the borrower, as shown in Table 7; and the combination of the advance payment requirement with this form of the sinking fund plan, as shown in Table 8, makes the cost still higher.

Where "expenses" or extra charges in any form are taken out of the amortization payments, they should be considered just as much a part of the cost of the loan as that part of the payment which is labeled interest.

In the comparison of the various plans discussed in the foregoing pages, emphasis has been laid upon the size of the annual installment as the most convenient and most reliable basis for determining the relative desirability of the various amortization plans presented. Other figures, such as the total amount paid for interest (especially where there are additional costs which have to be paid out of the installments), or the "average interest rate," are frequently used as a basis for comparison, but it is often difficult for the prospective borrower to find out exactly how these figures are obtained. The amount of the annual payment required, given in dollars and cents, for an equal number of payments at the end of the year, forms a definite and concrete index to the relative cost of a loan under two or more different plans.

In most cases a prospective borrower will be able to work out for himself, from the figures given in Table 1, the annual installment for a loan, at a given rate, yielding a given amount of cash, and paid off at the end of a given number of years. The Office of Markets and Rural Organization of the United States Department of Agriculture is prepared to give further information in regard to this or other specific phases of the rural credit problem.



